RAYTHEON 520 SYSTEM
PERIPHERAL EQUIPMENT

RAYTHEON COMPUTER RAYTHEON

RAYTHEON 520 SYSTEM

The Raytheon 520 System provides the most powerful and useful input/output capability available in machines of its class. Input, output, and computing can occur simultaneously. Maximum input-output character rate is four million characters per second; word rate is 1MC.

The Raytheon 520 input/output system consists of the following basic components:

1. The peripheral device controller

2. The peripheral device

3. The bus system of communication

4. The 520 input/output control section

A peripheral device communicates with the 520 through a peripheral device controller. Each peripheral device has its own controller which is connected to the input/output system. This method lends itself to economy in that the user need only order what he must have for his particular 520 system configuration. This also provides ease of system expansion and replacement when more advanced peripherals are available.

The peripheral device controller will respond to computer control commands, will accept and provide synchronizing signals required by the 520 System and the device, will provide word or character buffering with error detection, and will provide any voltage level and impedance matching required. The peripheral device controller frees the computer from constantly checking an input/output operation

and indicates to the 520 when any transfer of data should take place.

The input/output bus system consists of three cables connected serially to every peripheral device controller in a 520 System configuration. The input bus can transmit 25 bits of data or status information to the 520 from any peripheral device controller. The output bus has 25 bits of data transmission capability and can transmit either data or peripheral device select information from the 520 to any peripheral device controller. The control bus will transmit the control signals generated in the communications between the 520 and any peripheral device controller. Communication over the bus system is accomplished with current mode signal transmission, providing greater noise rejection and faster signal switching.

Ease of programming has been attained by the use of only two input or output commands and a four-state commutator. The two commands are SELECT and DATA TRANSFER. The SELECT command will put the desired peripheral device controller on-line with the 520. A peripheral device controller must be on-line before anything other than a status response can be accomplished. The DATA TRANSFER command will result in the transfer of data to or from the 520, will send a status response to the 520 from the selected peripheral device controller, or will cause the selected peripheral device controller to go off-line. The commutator is a two-bit binary counter which steps at the clock rate or can be locked to a particular state. The commutator is used to synchronize the transmission of data over the input/output bus by many peripheral devices.

KEYBOARD/DISPLAY STATION 519766

The Keyboard/Display Station is a valuable tool for on line program debugging. Programs are displayed on the Keyboard/Display Station with mnemonic and location in a format identical to the programmer's coding sheet, a "page" of coding at a time.

The editing features of the Keyboard/Display Station are used to make corrections to the program. The programmer may "thumb through the pages" of his program stored in memory just as he can thumb through his coding sheets.

In a data acquisition system, the Keyboard/Display Station may also be used for "quick-look" display of test data or results, as the test progresses. The ability to address locations on the Keyboard/Display Station screen by the computer permits the output of only the changing information by the computer at a 25 μsec. per character rate rather than requiring a complete "page" of information for each change which would require 15 milliseconds.

This light demand on computer time permits a continuous presentation of important test parameters as they change.

SPECIFICATIONS:
Standard Format: . . . . .13 lines, 40 characters/line
Standard Programming
Character Repertoire: . . . . .64 characters
(Special Character Sets Available at Extra Cost)
Typical Character Size: . . .0.17 inches high and 0.14 inches wide (can be modified to meet customer requirements).
Display Area on Cathode Ray Tube: . . . . .6½" by 8½"

LINE PRINTER 517857

The Line Printer is an electro-mechanical device for printing data at a high rate of speed. This device is a solid state, self-contained unit which has a full line width buffer, power electronics, and control logic for on-line operation. Operation is fully automatic during programmed printing; however, operator controls are provided for adjusting and positioning paper tension and print. The line printer is designed for edge perforated fanfold paper in multiple carbons or pressure paper. The controller for the line printer is part of the basic I/O chassis in the main frame of the 520.

SPECIFICATIONS:
Printing Speed . . . . .300, 600, or 1250 lines per minute
Line Width . . . . .80, 120, 132, or 160 columns
Characters per column 64
Line Format
Horizontal . . . . .10 columns per inch
Vertical . . . . .6 lines per inch
Printer Size . . . . .56" long x 30¼" wide x 57" high
Power Requirements . . . . .115 VAC, 60 cycle, single phase or 208VAC, 60 cycle, 3 phase, 4 wire or 230VAC, 60 cycle, single phase, 3 wire

MAGNETIC TAPE CONTROLLER 517615

MASTER TAPE TRANSPORT 516635

The Magnetic Tape Controller consists of a cabinet with the magnetic tape controller logic chassis, power supplies, and a power sequencer. The controller will respond to all commands from the 520 (SELECT, DATA TRANSFER, DISCONNECT, etc.) and can control up to four transports. The controller will generate and respond to control signals necessary to transport operation (motion control, load point, read clock, etc.). The word format (1, 2, 3, or 4 characters per word) is determined during the selection of the controller. There are two 24-bit registers in the controller. The 24-bit input register can accept a word transfer from the 520 or can assemble a word during a tape read operation. The 24-bit output register can transmit a word to the 520 or can disassemble a word into 6-bit characters during a tape write operation. The controller will generate parity (odd-binary, even-alphanumeric) during a tape write operation and will check the parity during a tape read operation. The controller has control logic for connection of up to four tape transports of the same type (45 ips or 75 ips).

SPECIFICATIONS:
Cabinet size ....75.5" high x 23" wide x 30" depth
Weight ....525 pounds
Power Requirement ....208VAC, 60 cycle, single phase, 4 wire

SINGLE TAPE TRANSPORT/517567

The single Tape Transport has all the design features of the Master Tape Transport except for the data electronics switcher and the control and status line switcher. This unit cannot be used to control tape transports.

The Master Tape Transport is a medium speed-75 ips-solid state digital tape unit. The Transport features electro-mechanical tape handling, magnetic head, operator control panel, load point and end of tape sensing and control, file protection, fast and slow rewind, write-read data electronics, data electronics switcher, control and status switcher, and all necessary power supplies. The Master Unit has one set of write-read electronics which can be utilized by the master and up to three slave tape transports. The data electronics switcher directs the data electronics to the proper write-read head in response to a command from the Magnetic Tape Controller (517615). The various controls and status commands are directed to the proper unit by the control and status line switcher. This arrangement allows input/output access to four tape transports through a single input/output channel. The tape transport assembly design features vacuum column tape buffers, counter rotating capstans, solenoid type actuators, positive alignment pinch rollers, and rugged disk-type reel brakes.

SLAVE TAPE TRANSPORT/516637

The Slave Tape Transport has all the design features of the Master Tape Transport except for write-read electronics, data electronics switcher, and the control and status line switcher.

SPECIFICATIONS:
Tape Speed ....75 ips—forward and reverse
Reels ....10½" diameter, ½" width, (IBM compatible)
Start Time ......5 ms, bi-directional
Stop Time .....1.5 ms, bi-directional
Rewind ....Less than 3 minutes
Tape Density ......200, 556, 800 bpi
Transfer Rates ...15.0 KC at 200 bpi
41.7 KC at 556 bpi
60.0 KC at 800 bpi
Transport size ...69" rack x 30" x 24"
Weight ....390 pounds (516635)
340 pounds (516637)
370 pounds (517567)
Power Requirements .....105 to 125 VAC, 58-62 cycle, single phase
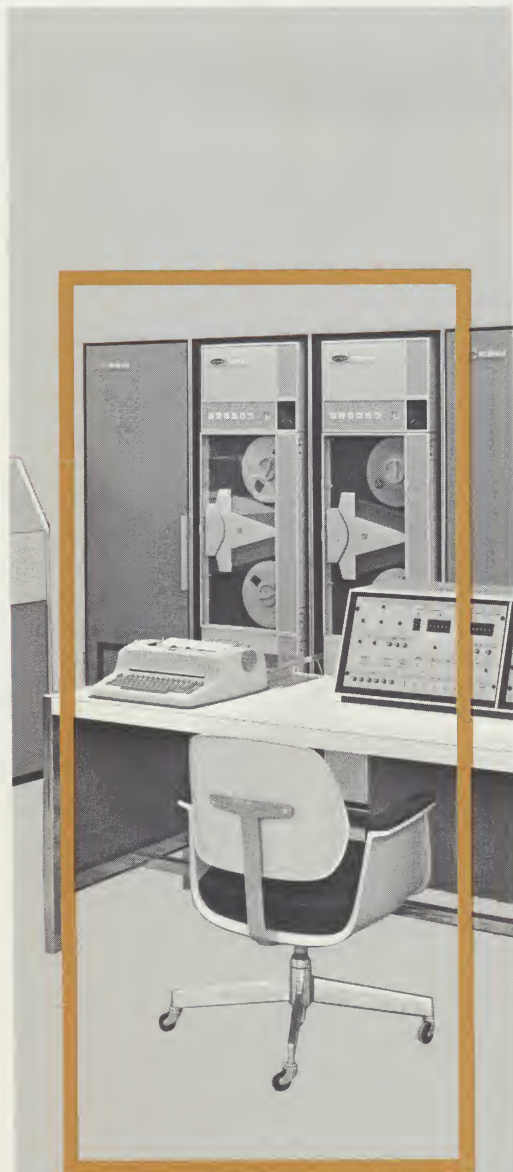
MASTER TAPE TRANSPORT 517628
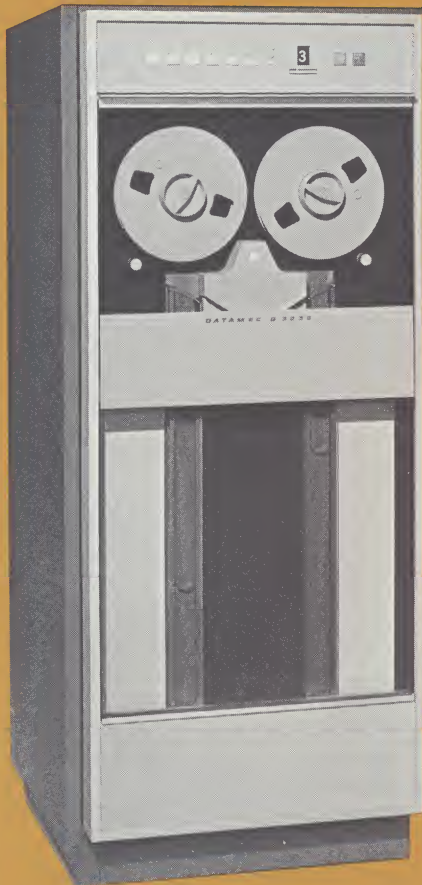
The Master Tape Transport is a solid state device with the following component assemblies: tape transport, write-read head assembly, photosense, file protect, operator control panel, write-read data electronics, data electronics switcher control and status switcher and all necessary power supplies. The Master Unit has one set of write-read electronics which can be utilized by the master and up to three slave tape transports. The data electronics switcher directs the data electronics to the proper write-read head in response to a command from the Magnetic Tape Controller (517615). The various controls and status commands are directed to the proper unit by the control and status line switcher. This arrangement allows input/output access to four tape transports through a single input/output channel. The tape transport assembly design features vacuum column tape buffer storage, vacuum tape dust and oxide cleaners integral in the head assemblies, short unsupported tape spans to minimize skew and speed variations, and synchronously driven counter rotating capstans with ample reserve power.

SLAVE TAPE TRANSPORT/517630

The Slave Tape Transport has all the design features of the Master Tape Transport except for write-read electronics, data electronics switcher, and the control and status line switcher.

SPECIFICATIONS:

Tape Speed . . . . .45 ips—forward and reverse
Reels . . . . .10½" diameter, ½" width (IBM compatible)
Start Time . . . . . .5 ms, bi-directional
Stop Time . . . . .1.5 ms, bi-directional
Rewind . .3 to 4 minutes for 2400 feet
Tape Density . . .200, 556, and 800 bpi
Transfer Rates . . . .9.0 KC at 200 bpi
25.0 KC at 556 bpi
36.0 KC at 800 bpi
Transport Size . . . . .75.5" high x 23" wide x 30" depth
Weight . . . . . . .425 pounds (517628)
355 pounds (517630)
390 pounds (517626)
Power Requirements . . . . .105 to 125 VAC, 58-62 cycle, single phase

SINGLE TAPE TRANSPORT/517626

The single Tape Transport has all the design features of the Master Tape Transport except for the data electronics switcher and the control and status line switcher. This unit cannot be used to control slave tape transports.

DIRECT MEMORY ACCESS

EXTERNAL ACCESS TO MEMORY (EAM)/519731

The External Access to Memory switches memory between the 520 and an external device so the two devices can access memory without interference on a time-shared basis. The external device has priority and can maintain control of memory. EAM interface is standard 520 current mode for both computer and external device.

DIRECT MEMORY ACCESS I/O CONTROLLER/519730

The DMA I/O Controller allows up to four peripheral devices access to memory through the EAM. The DMA I/O Controller is connected to the 520 I/O bus and controls memory through the EAM by presenting the same interface as the computer; i.e., memory address, data out and data in busses, and read and write control signals. It also controls the peripheral devices connected to it through their controllers by presenting the same interface as the 520; i.e.. I/O control, data out and data in busses.

## DMA I/O CONTROLLER HIGH SPEED OPTION/519729

Where several devices must be operated simultaneously and one unit must have access immediately, an optional register set eliminates the memory access for control purposes. Each set defines one block of memory with necessary control information.

SPECIFICATIONS:

Maximum Transfer Rate	1 μsec
Connect Time per Channel	2 μsec
Disconnect Time per Channel	2 μsec
Servicing Alternate Channels	200 KC
Number of Channels per DMA I/O (same as 520 I/O)	4
Number of Memory Blocks per Channel	2
Block Lengths	Variable
Block Locations	Variable
Changing Assigned Blocks of a Channel (not computer time)	4 μsec
Word Size	24 bits

CARD READ-PUNCH
503948
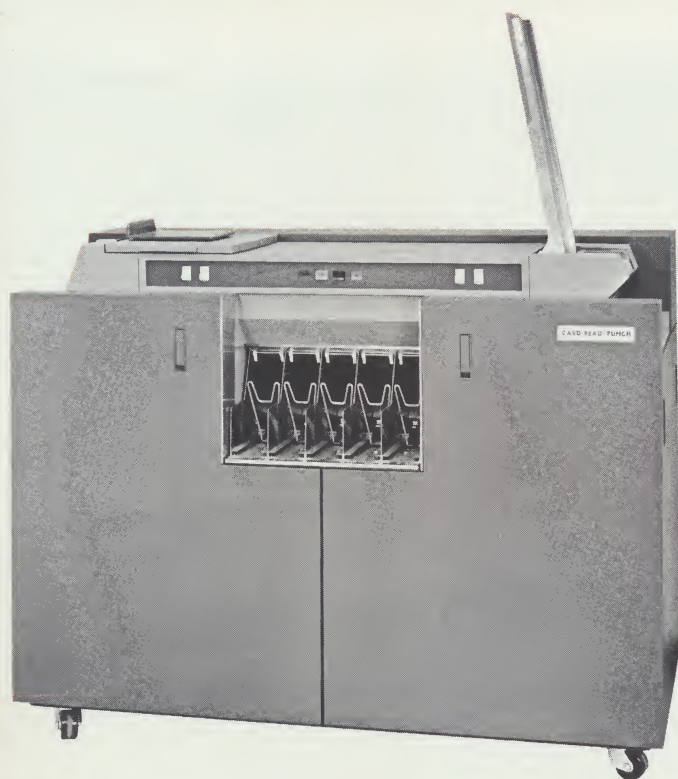
The Card Read-Punch is a device which can read standard 80-column cards at 800 cards per minute and punch cards at 250 per minute. Card reading and punching are by row with independent reading and punching achieved through the use of an opposing feed design. The Card Read-Punch unit has easy access to all operating mechanisms and the operator control panel. Ease of card handling in both hopper and stacker, sensitive misfeed detection, and automatic shutdown for prescribed events (full stacker, transport jam, etc.) are incorporated in both read and punch feed mechanisms.

SPECIFICATIONS:
Read Speed ....800 cards per minute
Punch Speed ....250 cards per minute
Hopper Capacity Reader ....3000 cards
                     Punch ....1200 cards
Stacker Capacity Reader ....1000 cards
                     Punch ....1000 cards
Unit Size...............62" high x 58" wide x 30" depth
Power Requirements....208 VAC, 60 cycle, 3 phase, 4 wire

CARD READ-PUNCH CONTROLLER 517614

The Card Read-Punch Controller consists of a cabinet with the card controller logic chassis, power supplies, a power sequencer, and a remote power supply for the Card Read-Punch unit. The controller synchronizes all data and control signals between the Raytheon 520 and the Card Read-Punch. The controller has an 80-bit buffer for the Card Punch and an 80-bit strobe circuit for the Card Reader. Simultaneous reading and punching, error condition checking, data analysis, format control, and Card Read-Punch operations are under the control of the 520 through the Card Read-Punch Controller.

SPECIFICATIONS:
Cabinet Size ....75.5" high x 23" width x 30" depth
Weight ....:.500 pounds
Power Requirements ..208 VAC, 60 cycle, 3-phase, 4 wire

CARD PUNCH CONTROLLER/518686

The Card Punch Controller consists of a cabinet with the card punch controller logic chassis, power supplies, and a power sequencer. The controller will respond to all commands from the 520 (SELECT, DATA TRANSFER, DISCONNECT, etc.) and can control one card punch unit. The controller will generate and respond to control signals necessary to card punch operation (card feed, reset punch buffer, etc.). The controller contains an 80-bit punch buffer for row mode operation with all data formatting controlled by the 520.

SPECIFICATIONS:
Cabinet Size ....75.5" high x 23" width x 30" depth
Weight ....500 pounds
Power Requirements ..208 VAC, 60 cycle, 3 phase, 4 wire

CARD PUNCH/519467

The Card Punch is a device which will punch standard 80-column cards at the rate of 100 cards per minute. The cards are punched by row under control of the Card Punch Controller.

SPECIFICATIONS:
Punch Speed ....100 cards per minute
Hopper Capacity ....800 cards
Stacker Capacity ....1,000 cards
Unit Size ....50" high x 50" width x 25½" depth
Power Requirements .....115 VAC, 60 cycle, single phase

CARD READER 517980
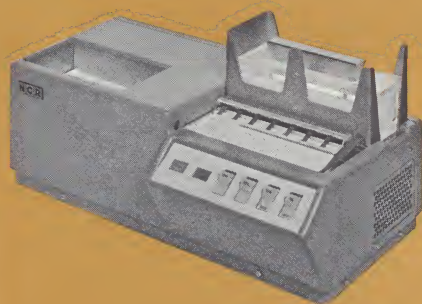
The Card Reader is a device which will read standard 80-column punched cards by column at a rate of 100 cards per minute. Under program control a card can be read in the binary mode (12 bits) or can be read in the alphanumeric mode (6 bits). The alphanumeric mode has a Hollerith-to-520 code conversion (12 bits to 6 bits). The card reader is a compact, lightweight unit with convenient access to all controls. Reliable starwheel operated switches are used for data hole detection. The controller for the Card Reader is part of the basic I/O chassis in the main frame of the 520.

SPECIFICATIONS:
Read Speed .... 100 cards per minute
Hopper Capacity ....500 cards
Reader Size .....18″ long x 10″ wide x 9″ high
Reader Weight ....25 pounds
Power Requirements ......115VAC, 60 cycle, single phase

CARD READER 519468-001

The Card Reader is a device which will read standard 80-column punched cards by column at a rate of 400 cards per minute. Under program control a card can be read in the binary mode (12 bits) or alphanumeric mode (6 bits). The alphanumeric mode has a Hollerith-to-520 code conversions (12 bits to 6 bits). Both the card reading and the card timing are photoelectric. Simplicity of design results in ease of operation. Cards may be loaded and unloaded during card read operation and extensive error checking results in ease of maintenance. The controller for the Card Reader is part of the basis I/O chassis in the main frame of the 520.

SPECIFICATIONS:
Read Speed .... 400 cards per minute
Hopper Capacity ....1,400 cards
Stacker Capacity ....1,000 cards
Reader Size ....18″ high x 22″ wide x 30″ depth
Reader Weight ....125 pounds
Power Requirements ......115VAC, 60 cycle, single phase

CARD READER 519468-002

The Card Reader is a device which will read standard 80-column punched cards by column at a rate of 800 cards per minute. Under program control reading may be binary (12 bits) or alphanumeric (6 bits). The alphanumeric mode has a Hollerith-to-520 code conversion (12 bits to 6 bits). Solid state electronics are used for photoelectric hole detection, card timing pulses, and error checking circuitry. Error checking includes throat jam check, transport check, output hopper jam check, photo diode check, and timing photo diode check. All controls have easy access; card handling during operation is facilitated by simplicity of console design. The controller for the Card Reader is part of the basic I/O chassis in the main frame of the 520.

SPECIFICATIONS:
Read Speed ....800 cards per minute
Hopper Capacity ....2,500 cards
Stacker Capacity ....2,000 cards
Reader Size ....40″ high x 29″ wide x 33″ depth
Reader Weight ....325 pounds
Power Requirements ......115VAC, 60 cycle, single phase

TYPEWRITER
517856/517733

The Typewriter is a 64-character input/output device capable of typing at rates up to 15 characters per second. Characters typed out by the typewriter are spaced 10 to an inch horizontally and 6 to an inch vertically. Unique design features include high print speed and a stationary carriage. The Typewriter accepts coded parallel bits (7 bits, including check) for alphanumeric printout. In addition, it generates coded parallel bits from keyboard operation for input purposes. Remote shift, line feed, backspace, solenoid operated keyboard lock, and end of line indication are provided as standard equipment. The controller for the Typewriter is part of the basic I/O chassis in the main frame of the 520.

SPECIFICATIONS:

Printing Cycle ....15.5 cps.
Cycle Time ....65.5 ms.
Carrier Return and Tabulation ....17" per second
Shift Cam and Clutch ....15.5 cps.
Backspace ....15.5 cps.
Spacing ....15.5 cps.
Type Element ....913 (programming)
Writing Line Length ....13" Rack Mounted (517856)
                            13" For Console Mounting (517733)

TAPE PREPARATION UNIT
516850

The Tape Preparation Unit is an off-line preparation desk equipped with a typewriter, a paper-tape punch with supply and take-up reels, and a paper-tape reader with bi-directional tape reading capability.

Five operating modes are available on this unit: read-type-punch, read-punch, read-type, type-punch, and type. Other features: 7-bit (alphanumeric) 8-bit (binary) code select, single character read (forward or reverse), parity error and reader error indicators, and 8-bit stop code selection which provides for any 8-bit code to be punched or searched for on the reader.

SPECIFICATIONS:

Height ....29 inches
Width ....30 inches
Length ....67 inches
Weight (including electronics) ....375 pounds
Reader Speed ....60 cps.
Punch Speed ....20 cps.
Typewriter Speed ....15.5 cps.

DISK PACK UNIT
517971
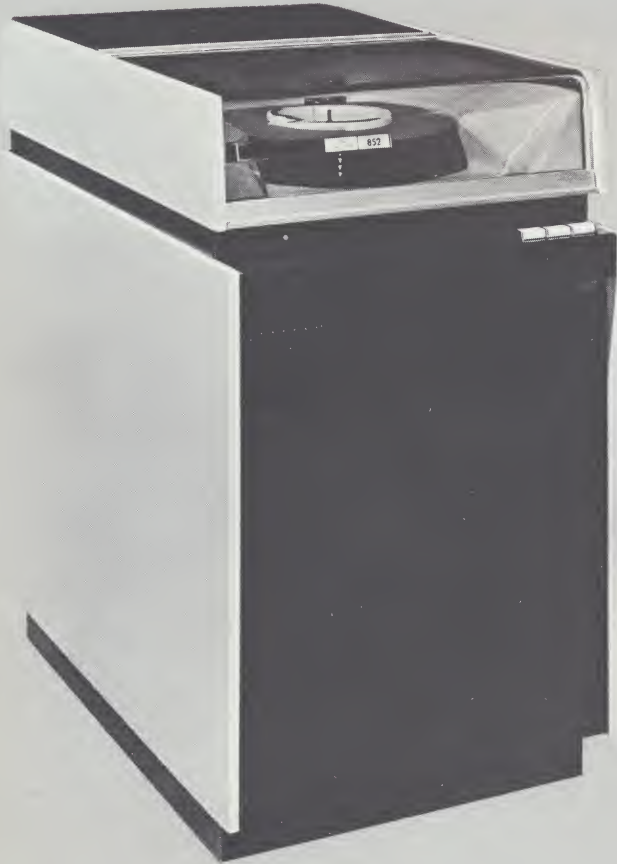
The Disk Pack Unit is a device which provides a fast, efficient means of information storage and retrieval. Information is stored on removable disk packs which can be interchanged between units without restriction. A disk pack can store 2 million alphanumeric characters when written in the sector mode or 2.98 million when written in the track-record mode. The access mechanism has ten read/write heads which track horizontally across the disk pack surface during a seek operation. Direct seek is a standard feature which reduces access time when changing tracks. Each of the ten surfaces has 100 tracks which can be divided into sectors (20 per track) or records (1 per track). The cylinder concept is used in the addressing of the access mechanism for IBM compatibility.

SPECIFICATIONS:

Physical Size ....40¾" high x 36" long x 24" wide
Weight ....480 pounds
Storage Capacity ......sector mode: 2,000,000 characters
               track-record mode: 2,980,000 characters

Tracks per Surface 100
Read/Write Heads 10
Maximum Access Time ....145 ms.
Maximum Latency Time ...40 ms. (1500 rpm disk speed)
Track to Track Access Time ....30 ms.
Character Definition ....7-bit BCD
Addressing ....IBM Compatible
Recording Method ....NRZI
Average Data Transfer Rate. sector mode: 50,000 char/sec.
               track record mode: 74,500 char/sec.
Power Requirements .....208 VAC, 60 cycle, three phase

DISK PACK CONTROLLER
517970

The Disk Pack Controller consists of a cabinet with the disk pack controller logic chassis, power supplies, and a power sequencer. The controller will respond to all commands from the 520 (SELECT, DATA TRANSFER, DISCONNECT, etc.) and can control up to four disk pack units. The controller will generate and respond to control signals necessary to disk pack operations (read/write control, head select, track select, etc.). The addressing format follows the cylinder concept with either sector mode or track-record mode. A cylinder can be defined as a vertical plane which contains ten tracks. Since the disk pack unit has ten read/write heads located in the same relative position on each surface there is no movement of the access mechanism when operating within a cylinder. Sequential operation within a cylinder can access up to 200 sectors with one command. Two 24-bit registers provide word buffering during read/write operations with automatic parity generation and checking.

SPECIFICATIONS:

Cabinet Size ....75.5" high x 23" width x 30" depth
Weight ....600 pounds
Power Requirements ..208 VAC, 60 cycle, 3 phase, 4 wire

DISK PACK/517972

The Disk Pack is a precision device which has six disks mounted ½" apart on a vertical shaft. Each disk is 14" in diameter and has two surfaces coated with magnetic iron oxide for recording information. Each surface has one hundred data tracks which are .020" apart. The inner track is 9" in diameter and the outer track is 13" in diameter. The six disks provide ten surfaces for recording data as the upper surface of the top disk and the lower surface of the bottom disk are not available due to protective plates. Each disk pack is removable and interchangeable between units. Each disk pack can store 2 million alphanumeric characters when written in the sector mode or 2.98 million characters when written in the track-record mode.

MULTIDEVICE CONTROLLER/517975

To meet the need of the computer data systems market, Raytheon Computer has designed a simplified and generalized computer interface, the Multidevice Controller, which is intended to be equivalent to a "Real-Time Data and Control System Package." The design philosophy employed recognizes the fact that customer capability has increased in recent years to the point where extensions of a basic logical design may be implemented with standard digital modules by virtually all laboratories making use of data systems equipment.

The Multidevice Controller (MDC) utilizes standard Raytheon Computer modules, power supplies, and mounting hardware. The MDC may be supplied in a low cost minimum configuration which may be expanded as required in the field by plugging in additional digital modules and/or by installing standard pre-wired sub-assemblies. It is practical to implement almost any imaginable system requirement in this manner. The standardized hardware and techniques result in lower cost, simpler and easier to maintain systems. In addition, modifications require far less time and effort.

MDC OPTION—MULTIDEVICE CONTROLLER EXPANSION/517976

This is an expansion of the device addressing capability of the MDC in increments of eight. The device addressing capability can be expanded in increments of eight to 512 devices.

MDC OPTION—REAL TIME CLOCK/517979

The Real Time Clock is a 24-bit system with a one megacycle or external clock input. This system can be read out or set to a desired configuration by command of the 520. The system can be connected to the normal or priority interrupt system for overflow detection.

MDC OPTION—FOUR-LEVEL PRIORITY INTERRUPT/517977

One of the optional features available with the MDC is a priority interrupt system which begins with four levels of priority and is expandable in increments of four to 32 levels. This permits a hardware priority level assignment which can be changed, at the requirement of the user, by changing the wiring to a patchboard.

The system examines all levels for the presence of an interrupt. When at least one interrupt is present, the system determines which has priority. Unless an interrupt of higher priority is being processed, the system will send an interrupt to the 520 and will generate an address unique to the priority interrupt. The 520 will acknowledge the interrupt and transfer to the subroutine to process the priority interrupt. The priority interrupt will be processed, unless interrupted by a higher priority, and will indicate completion to the priority interrupt system.

MDC OPTION—PRIORITY INTERRUPT SYSTEM EXPANSION/517978

This is an expansion of the Four-Level Priority Interrupt system by four levels. The four-level priority interrupt system can be expanded in increments of four to 32 levels.

Another option permits expansion of the priority interrupt system to 1024 levels in increments of two.

MDC OPTION—ASSEMBLY REGISTER/519469

The 24-bit Assembly Register can assemble one 24-bit word, two 12-bit words, three 8-bit words, or four 6-bit words. The determination of word size to be assembled can be program controlled or fixed externally by pin assignment. When the register is fully loaded, an interrupt will be generated.

POWER FAILURE PROTECTION SYSTEM/519470

The Power Failure Protection System monitors the AC input line to the 520. In the event of power failure, normal program sequence is interrupted and program control is transferred to a register save program. The register save program executes from a diode matrix memory and stores all the addressable registers and toggles into core memory. The location in core memory for register and toggle storage can be specified by the user when the system is purchased. Computer operation is halted at the termination of the register save program.

MAGNETIC DRUM CONTROLLER 519809

The Magnetic Drum Controller consists of a cabinet with the magnetic drum controller logic chassis, power supplies, power sequencing and the mounting for one magnetic drum unit. The controller will respond to all commands from the 520 (select, data transfer, disconnect, etc.) and can control up to four magnetic drum units. The controller will generate and respond to control signals necessary to magnetic drum operation (read/write control, ready line, etc.). The addressing format is word oriented and can be either random or sequential. Direct addressing to 1,048,576 words with automatic parity generation and checking is standard. Two 25-bit registers provide word buffering during read and write operations. In a sequential mode of operation track switching and disk switching is automatic with addressing required at the beginning of the operation only.

SPECIFICATIONS :

Cabinet Size	75.5" high x 23" width x 30" depth
Weight	650 pounds
Power Requirements	208 VAC, 60 cycle, 3 phase, 4 wire
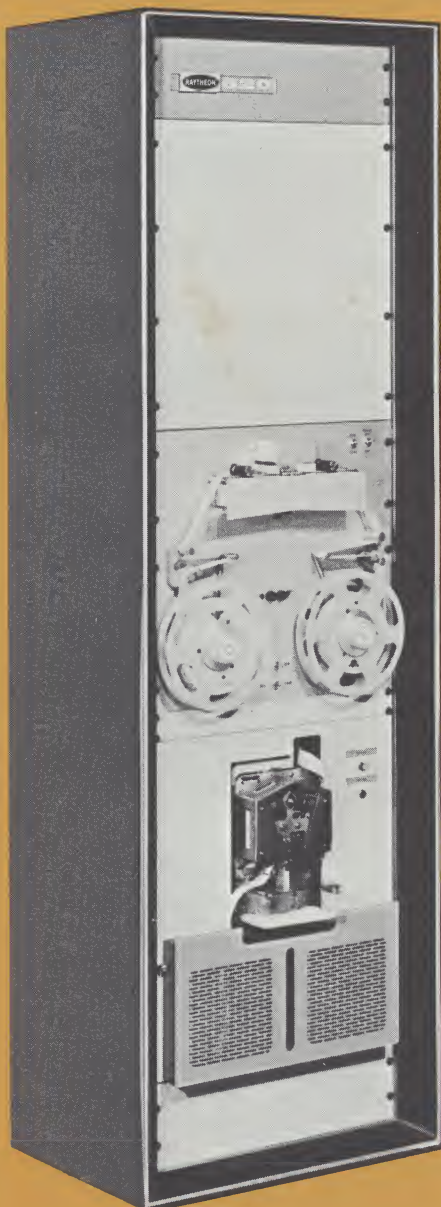
PAPER-TAPE READER/517622

The Paper-Tape reader is a photo-electric reader that will read up to eight-channel punched paper tape at a rate of 300 characters per second in either the forward or reverse direction. The paper tape may be read in either binary (8-bit) or alphanumeric (7-bit plus parity bit) mode. The controller for the paper-tape reader is part of the basic I/O chassis in the main frame of the 520.

SPECIFICATIONS:

Speed ....300 characters per second
Direction ....Bi-directional
Tape ....Tape Guide Adjustable for 11/16" or 1" Tape
Start Time ....8 ms.
Stop Time ....0.5 ms.

PAPER-TAPE SPOOLER/530507

The Paper-Tape Spooler is a bi-directional device which can automatically supply tape *to* and take up tape *from* the paper-tape reader at the proper speed and tension. Rewind operations can be performed in either the forward or the reverse direction.

SPECIFICATIONS:

Tape Speed, Servo Mode ....0-30 inches per second
Tape Direction, Servo Mode ....Bi-directional
Rewind Speed ....200 inches per second, bi-directional
Tape Width ....tape reel for 11/16" and 1" tape

PAPER-TAPE PUNCH/517624

The Paper-Tape Punch is a high speed electro-mechanical device which records information under program control on paper tape at speeds up to 110 characters per second. A high carbon steel punch pin assures positive tape perforation and long pin life. A self-adjusting brake mechanism provides positive control for rapid starting and stopping movements of the tape reel. An all steel cover and resilient rubber motor mounts reduce noise and absorb vibration. Information will be punched in either binary (8-bit) or alphanumeric (7-bit plus parity) mode. The controller for the paper-tape punch is part of the basic I/O chassis in the main frame of the 520.

SPECIFICATIONS:

Speed ....110 characters per second
Capacity ....1,000-foot roll of tape
Characters per inch ....10 characters
Tape Dimensions ....11/16" tape with 5 level code
1" tape with a 6, 7, or 8 level code

DRUM MEMORY

For applications where fast access and transfer rate to bulk storage are needed, the 520 System utilizes a high-speed, random access Drum Memory system. Maximum access time to the Drum is 10 milliseconds and transfer rate to and from the Drum is 50,000 words (200,000 characters) per second. Maximum data storage on the Drum is 262,144 words (1,050,624 characters). The Drum input/output controller will accommodate up to four Drum Memory units.

MAGNETIC DRUM MEMORY/519808

The Magnetic Drum Memory is a device which offers large memory capacity with fast access time. The recording surface has 256 data tracks and each data track has 512 words. The Magnetic Drum has eight timing tracks which are used by the controller to synchronize data transmission. A separate read/write head is provided for each track which allows simplicity of design and eliminates time consuming search and positioning operations. The unit is compact and is shock-mounted on a standard 19-inch slide rack.

SPECIFICATIONS:

Speed	6000 RPM
Access Time	5 milliseconds, average
Word Density	512 words per track
Tracks	256
Total Words per Unit	131,072
Word Time	19.5 microseconds
Physical Size	19" diameter x 18" high
Weight	100 pounds
Power Requirements	115/208 VAC, 400 cycle, 3 phase, 4 wire

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